Integrated Storm Water Management Planning (ISMP) with High Resolution Digital Terrain Model, automated water pumping network for drainage systems

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Problem

Storm sewage system development

Storm water in Kazakhstan:

- Storm water
- Rainfall
- Drainage system flow capacity
- Pollution / debris on ground

Problem

Rainfall mixes with what is on the ground:

- Oil, grease, and automotive fluids
- Fertilizers, pesticides, and other chemicals from gardens and homes
- Bacteria from pet waste and failing septic systems
- Soil from construction sites and other bare ground
- Soaps from car or equipment washing
- Accidental spills, leaky storage containers, tobacco spit and whatever else ends up on the ground.

Problem

Astana has 8 water treatment complexes, 2 water storage pounds and the total length of storm sewer collectors is more than 300 kilometers.

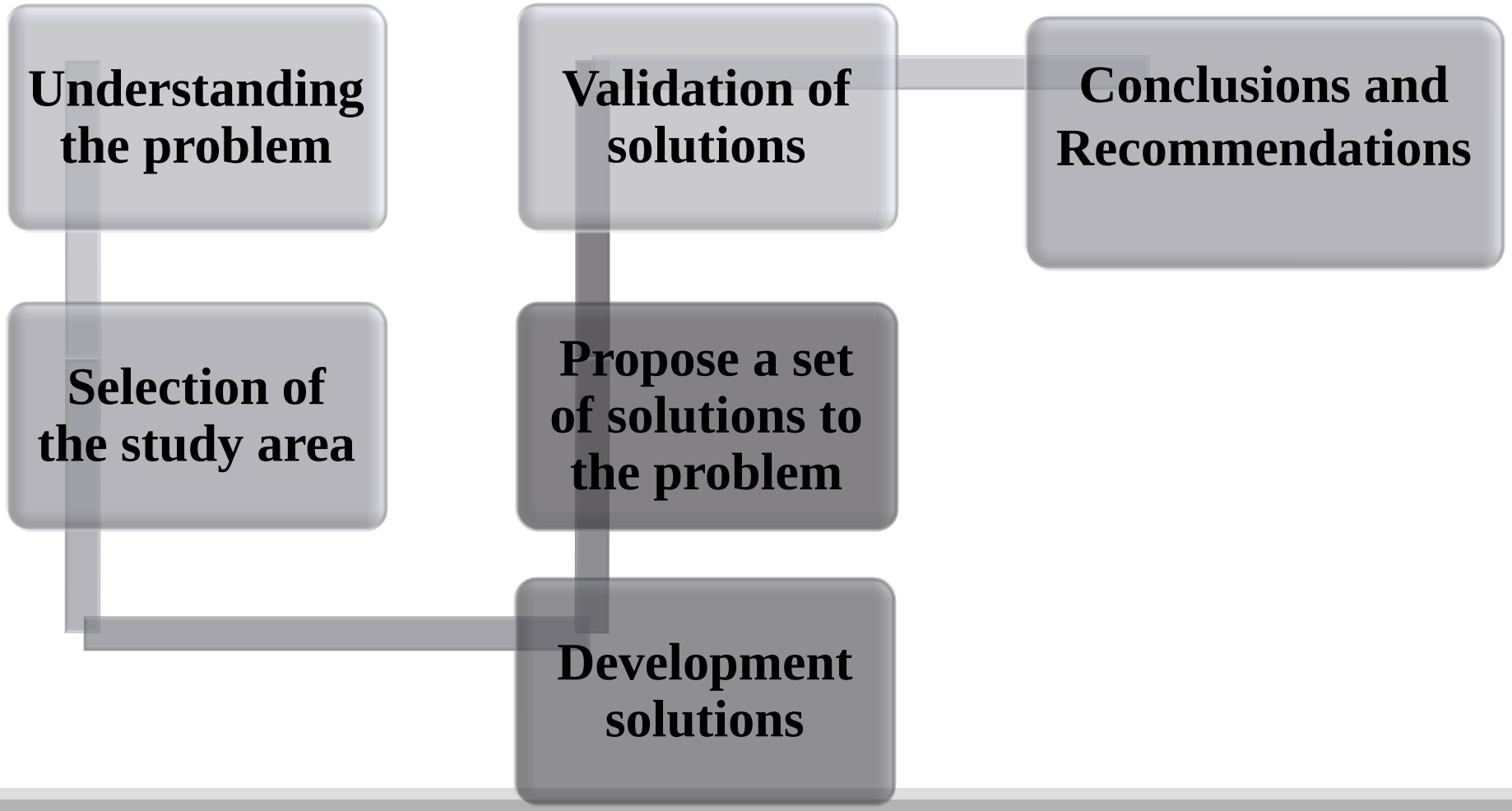
Current activities

- Local mayor has developed a program for 2017 – 2019
- Budget of about 10M USD to solve the storm water management problems.
- In 2017 Astana will have 16 facilities including water treatment complexes, water storage and storm sewer collectors.

Our offer

- Develop the automated sensor based platform to control the storm water
- Develop the geo-information portal, which remotely collects data from the sensors
- Identify areas with high risk of flooding
- Develop high resolution digital surface model using remote sensing and LIDAR datasets, including satellite data from Kazakhstan Space Agency Garysh Sapary KazEOSat-1,-2, which were launched in 2014
- Identify places for the location of tanks with drainage system in emergency situations

Methodology



Methodology

1. Digital Elevation Model

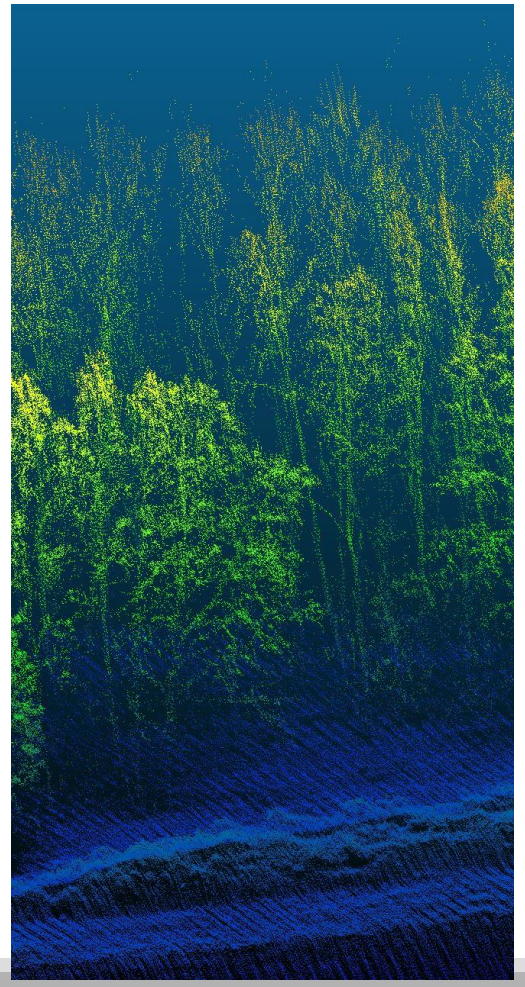
2. Bathymetry (bottom of reservoirs)

3. Digital Earth Model

Digital surface model

LIDAR

Laser scanning technology (LIDAR)



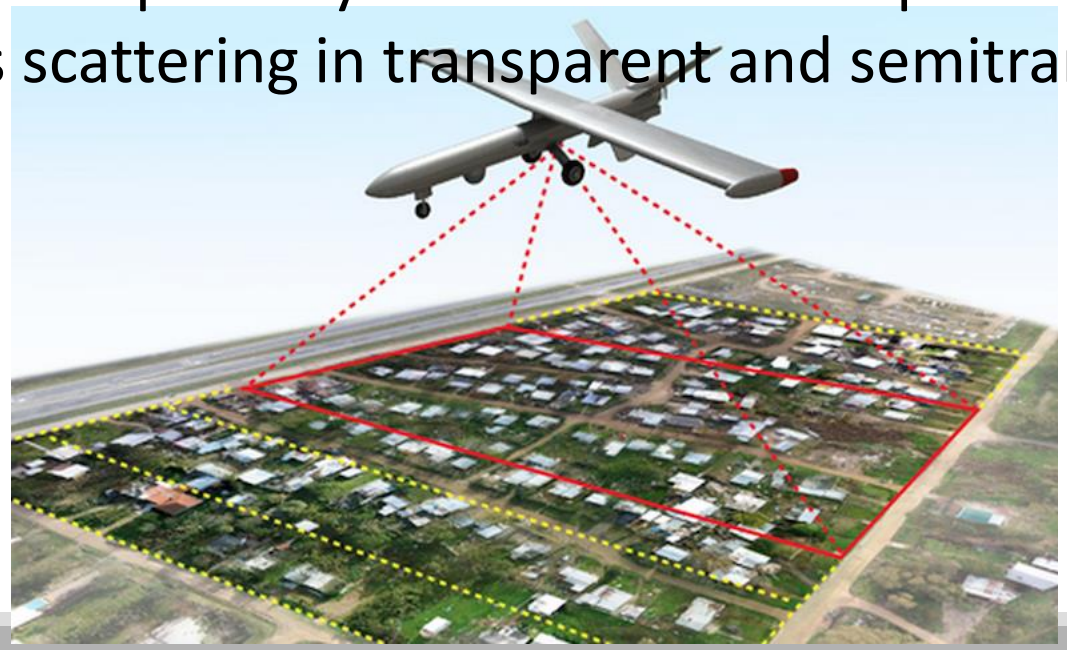
New and successful models of the earth's surface, suitable for data collection and remote sensing, are associated with the development of applications of laser scanning technology in photogrammetry.

In combination with modern computer technology and software development, the results of the research quickly approached the classic surveying requirements, when the density of the survey points was much higher and the time measurement was shortened - especially for large areas.

Methodology

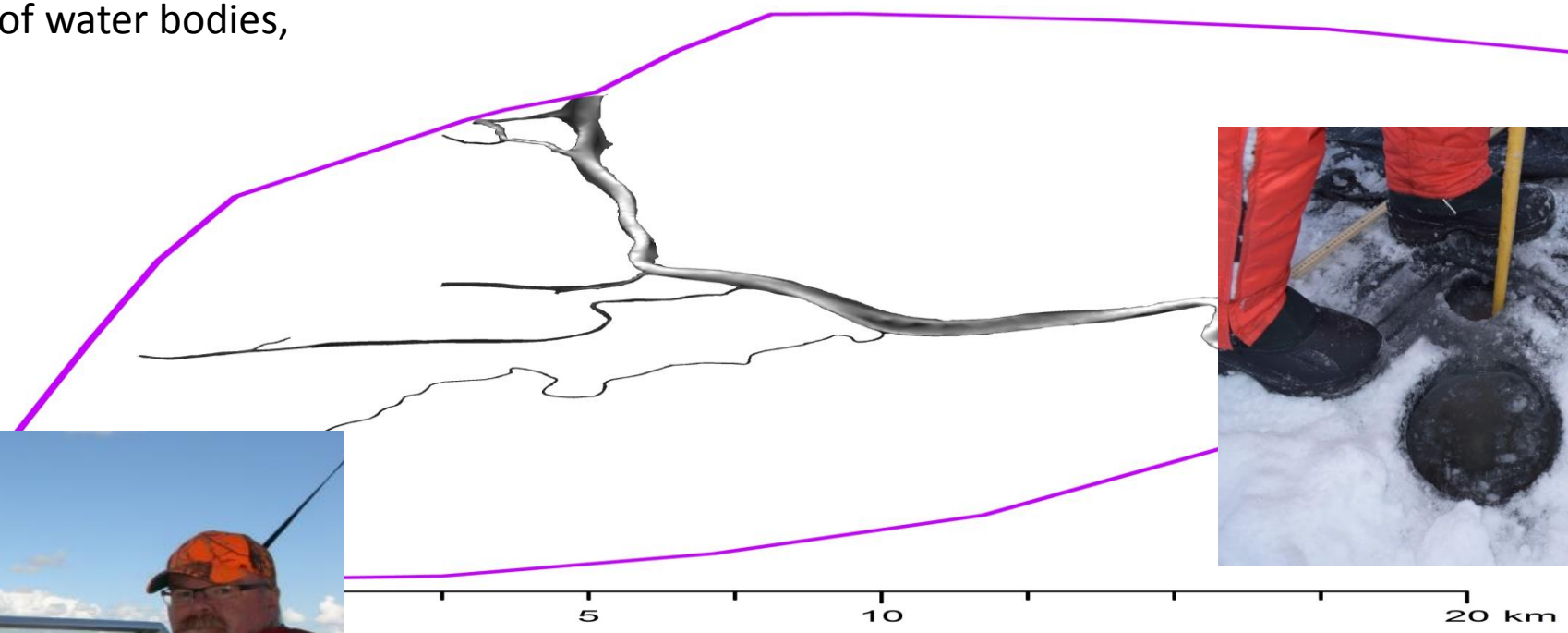
LIDAR

The technology of obtaining and processing information about remote objects using active optical systems that use the phenomena of light reflection and its scattering in transparent and semitransparent media.



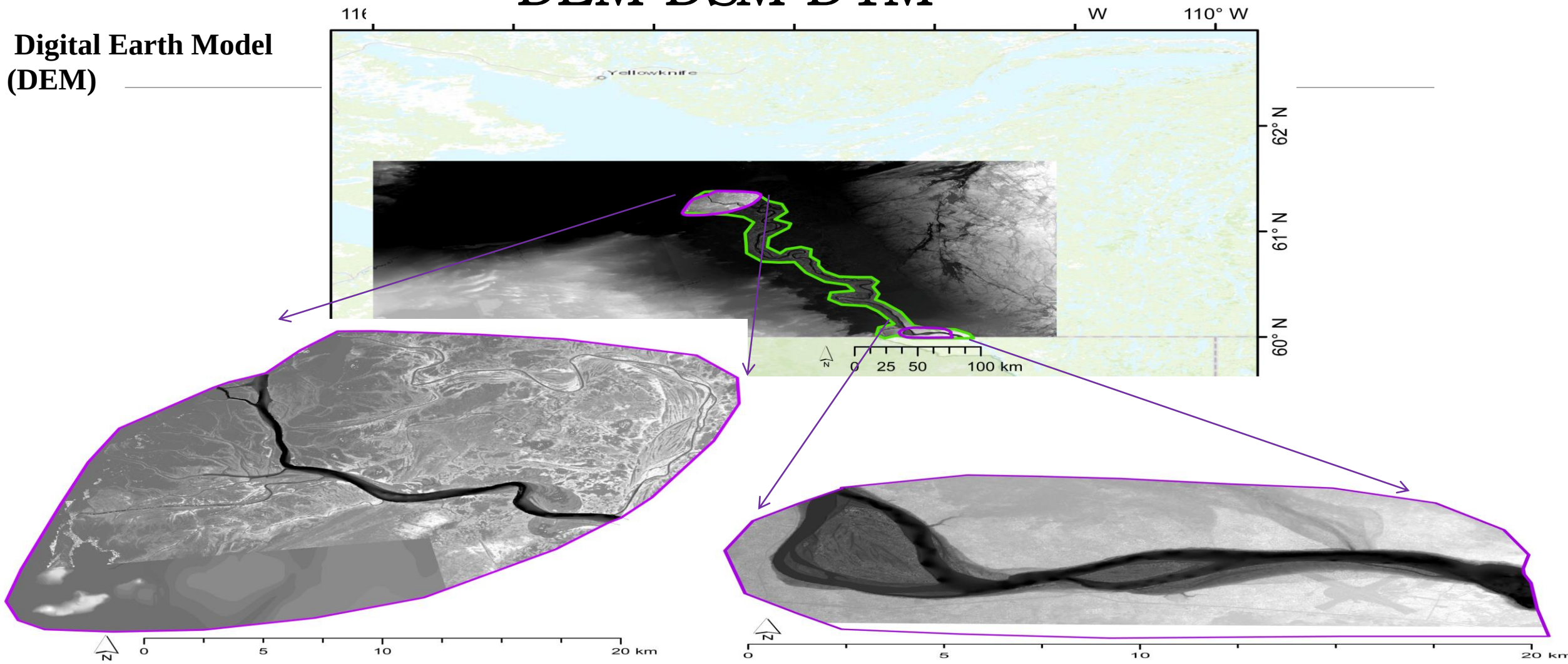
DEM-DSM-DTM

Bathymetry (the bottom of water bodies, rivers)



DEM ≠ DSM ≠ DTM

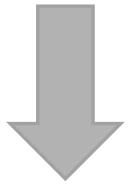
Digital Earth Model (DEM)



Methodology

Digital surface model

The direction of water flow in case of flood



Potential location of tanks

Geodetic Polygon

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LaMEC

http://www.lamec.org/

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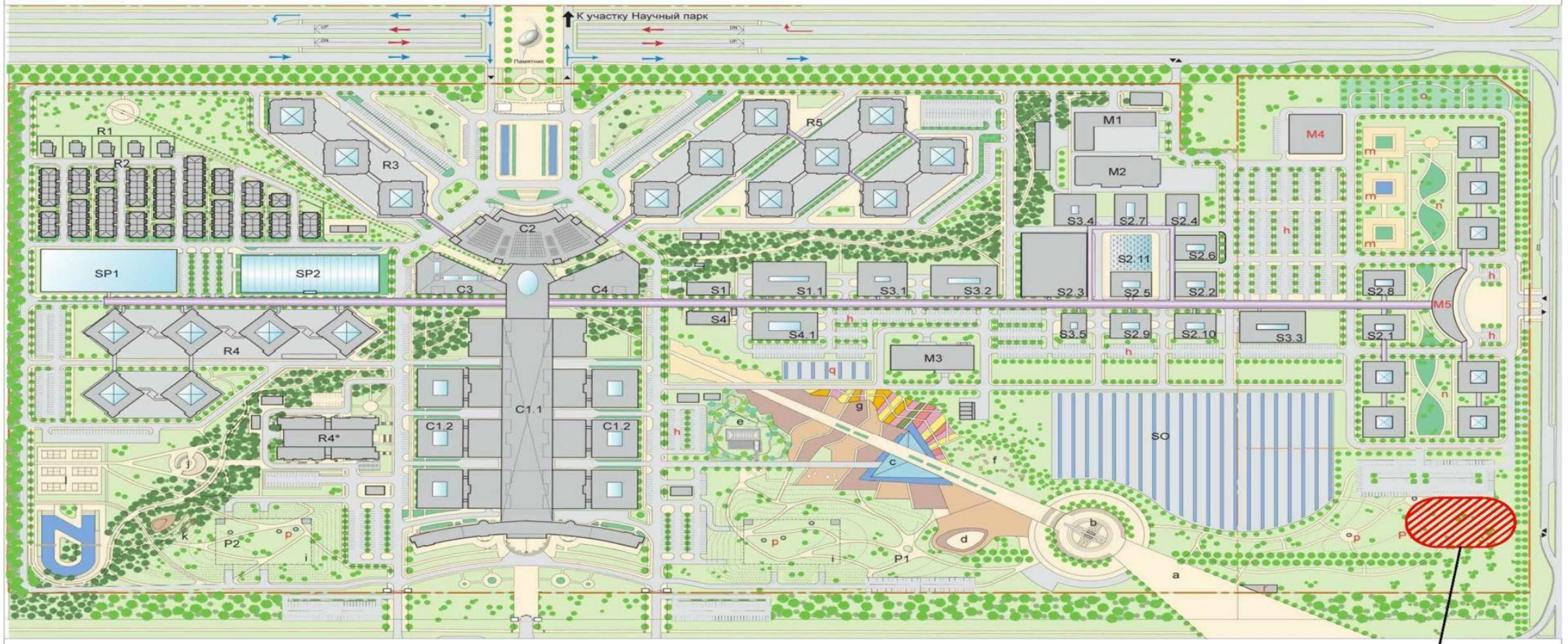
Scheme of the site location of geodetic polygon



Equipment

GPS R8 GNSS Trimble.

LEICA Systems

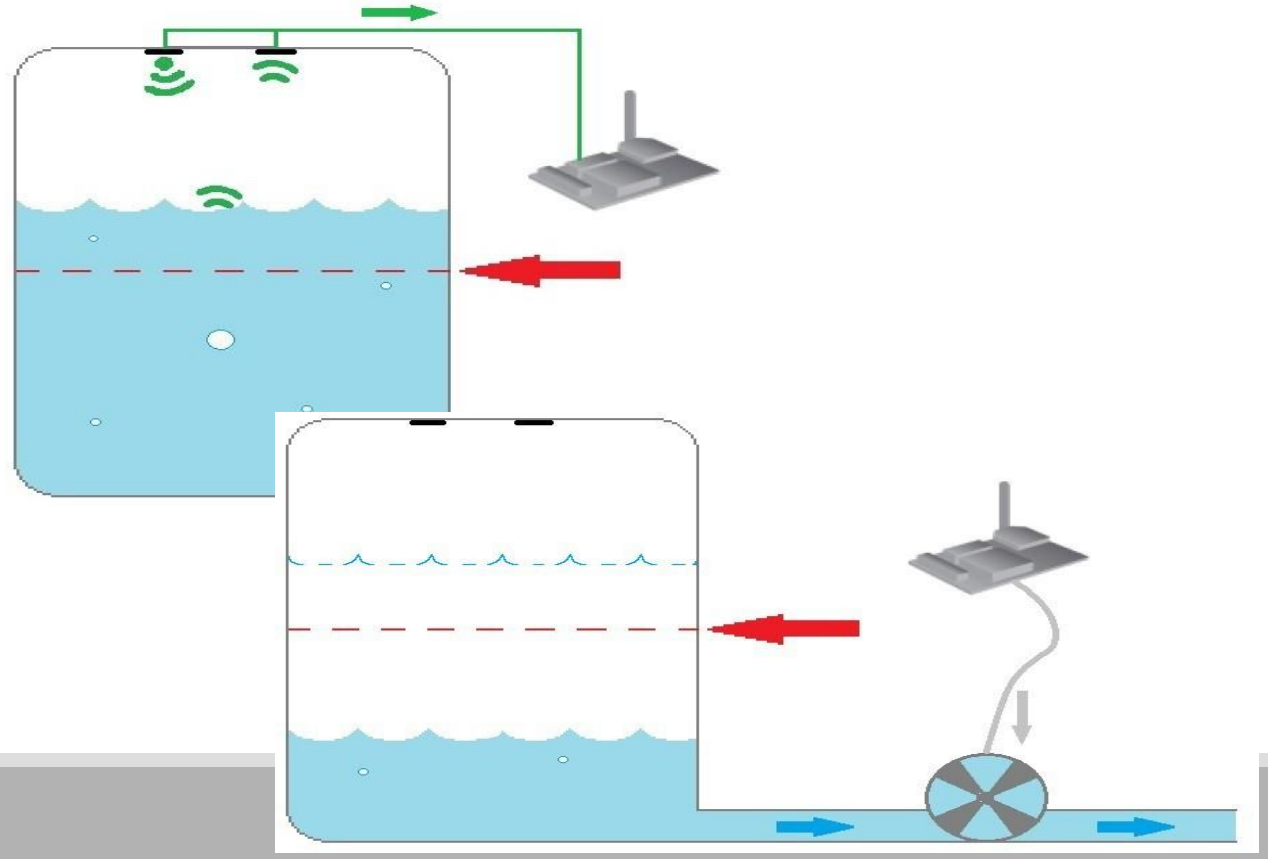
Leica tachymeter TS06 (http://www.leica.com)

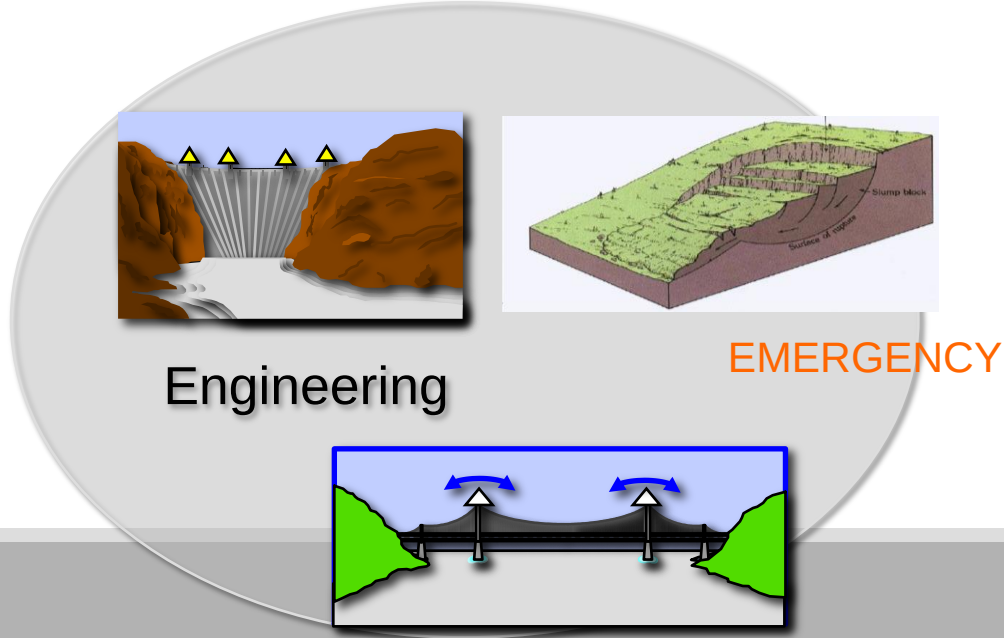
Methodology

Remote sensors of water level control

- Calculate amount of consumption and level of water
- Give signal for opening gateway
- Automatic opening of gateway at critical mark

Automated sensor system for the storm drainage network





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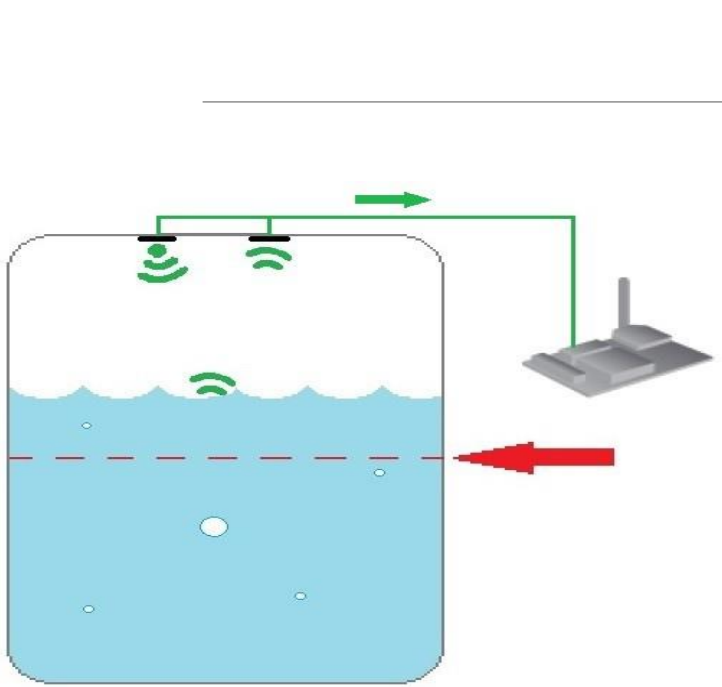

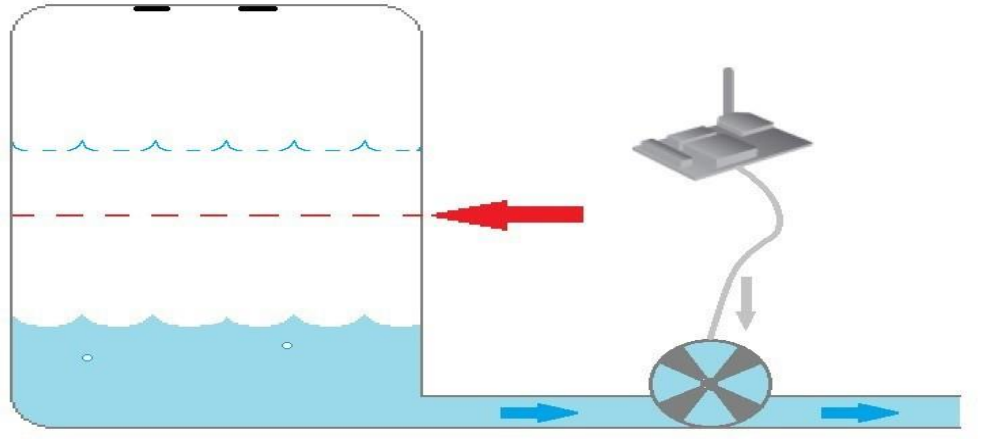

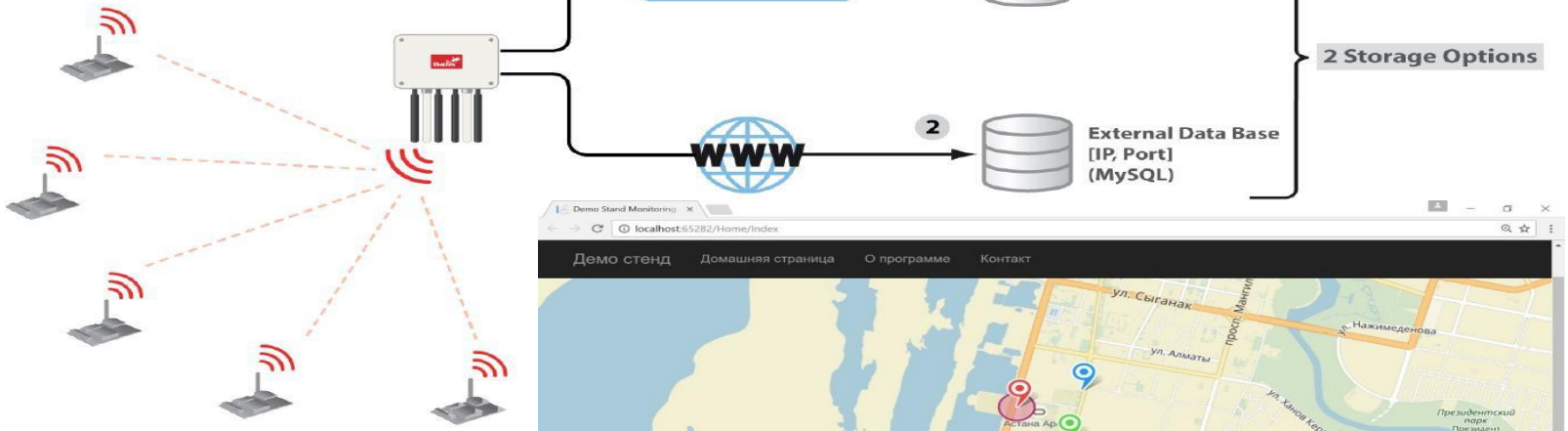

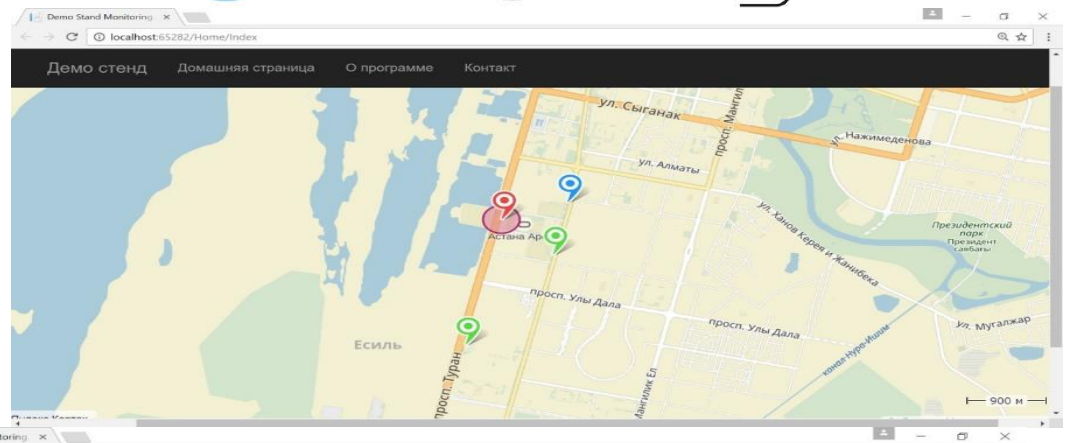

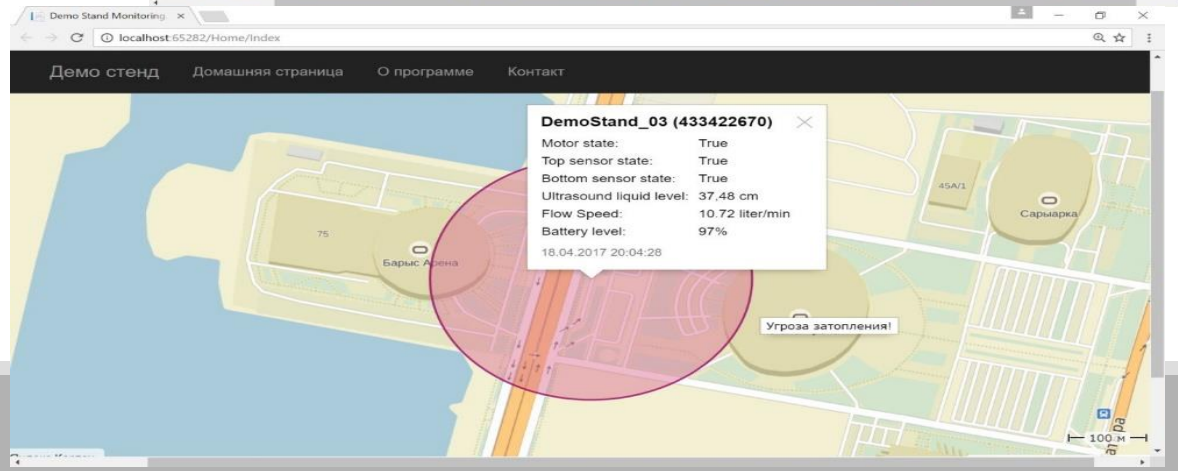


Smart City technologies
CRITICAL
DANGEROUS
NORMAL

Thank you

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https://www.youtube.com/watch?v=RLZdeb0yjds